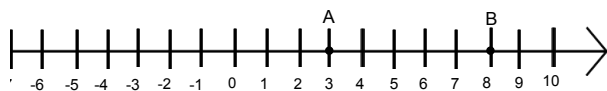
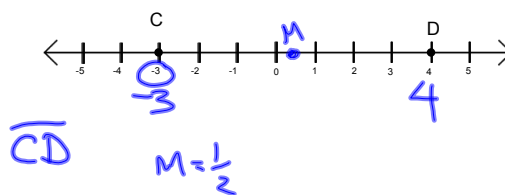


8-1 Midpoint and Distance Formulas

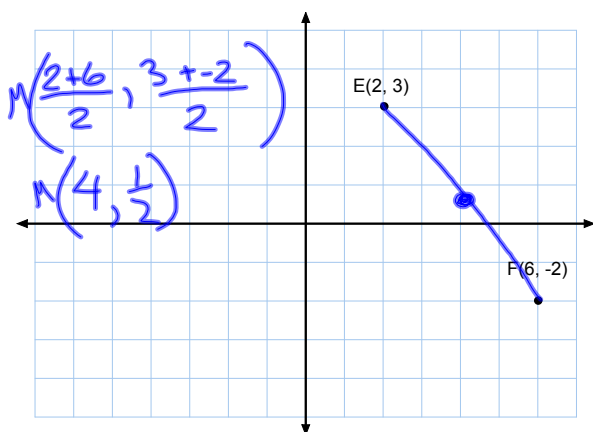


$$\overline{AB} \text{ midpoint } 5.5$$

$$\frac{3+8}{2} = 5.5$$



$$\overline{CD} \quad M = \frac{1}{2}$$



Midpoint Formula

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Find the midpoint of:

A(4, 3)

B(-2, 5)

$$M(1, 4)$$

M is the midpoint of \overline{AB} . Find the other endpoint if:

A(8, 3)

M(12, 5)

B(?, ?)

(x, y)

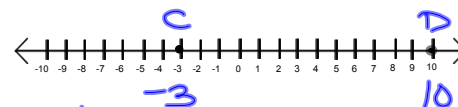
$$\left. \begin{aligned} \frac{8+x}{2} &= 12 \\ 8+x &= 24 \\ x &= 16 \end{aligned} \right\} \begin{aligned} \frac{3+y}{2} &= 5 \\ 3+y &= 10 \\ y &= 7 \end{aligned}$$

A(-1, 0)

M(-3, 5)

B(?, ?) (-5, 10)

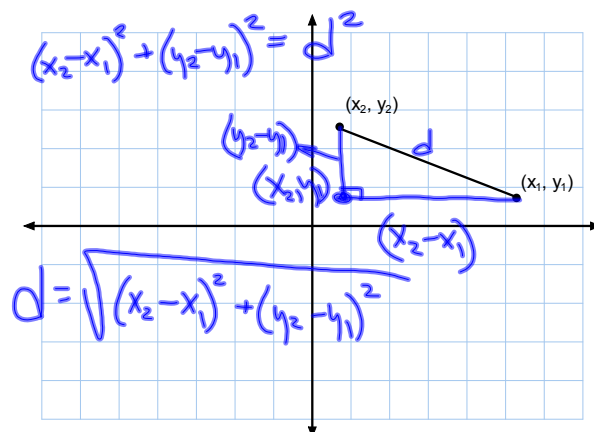
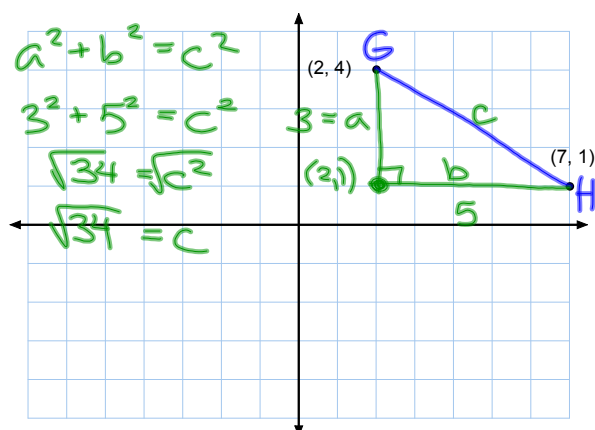
Find the distance between the two points.



$$CD = |10 - (-3)| = 13$$

CD \rightarrow the length of \overline{CD} 

$$EF = 8$$



The Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Find the distance between:

$(-1, 4)$ $(2, -3)$

$$d = \sqrt{(2 - -1)^2 + (-3 - 4)^2}$$

$$d = \sqrt{9 + 49}$$

$$d = \sqrt{58}$$

Find the distance between:

$(2, -5)$ $(3, 1)$

$$d = \sqrt{37}$$

Median of a triangle--is a segment that connects a vertex and the midpoint of the opposite side.

Example 1:

Find the length of the median from C to \overline{AB} .

A(-3, 0)

B(3, 2)

C(2, -4)



$$M\left(\frac{-3+3}{2}, \frac{0+2}{2}\right)$$

$$M(0, 1)$$

$$CM = \sqrt{(2-0)^2 + (-4-1)^2}$$

$$CM = \sqrt{4 + 25}$$

$$CM = \sqrt{29}$$

Example 2:

Find the length of the median from A to \overline{CB} .

A(-3, 0)

B(3, 2)

C(2, -4)



$$AN = \sqrt{\left(\frac{5}{2} - -3\right)^2 + (-1 - 0)^2}$$

$$AN = \sqrt{\left(\frac{11}{2}\right)^2 + 1}$$

$$AN = \sqrt{\frac{121}{4} + \frac{4}{4}}$$

$$AN = \sqrt{\frac{125}{4}}$$

$$AN = \frac{5\sqrt{5}}{2}$$

HW

p414-415

11-17, 25-33 odd, 36, 37